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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/932,236	08/16/2001	Haining Yang	MI22-1725	4828

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WELLS ST. JOHN P.S.
601 W. FIRST
SUITE 1300
SPOKANE, WA 99201-3828

EXAMINER	
HOGANS, DAVID L	
ART UNIT	**PAPER NUMBER**
2813	7

DATE MAILED: 05/22/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/932,236	Applicant(s) YANG, HAINING	
	Examiner David L. Hogans	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 May 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 August 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claim16 is objected to because of the following informalities: the second line of Claim 16 contains the word "comprises" and it appears to be superfluous. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 13 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 13 claims a reducing atmosphere comprised of activated hydrogen. Examiner is uncertain as to what activated hydrogen is? Furthermore, Examiner is unable to find activated hydrogen defined or discussed within the specification.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 3, 5 and 11-17 are rejected under 35 U.S.C. 102(b) as being anticipated by 6,074,945 to Vaartstra et al.

In reference to Claims 1, 3, 5 and 11-17 Vaartstra et al teaches:

- a semiconductor substrate with an oxidizable upper surface wherein the metal-comprising mass is formed against the upper surface (See column 2 lines 55-61 and column 5 lines 11-15)
- a metallo-organic precursor comprising ruthenium or tricarbonyl-cyclohexadiene ruthenium, both without platinum (See column 1 lines 45-60 and column 3 lines 28-30)
- exposing the precursor to a reducing atmosphere or NH_3 or H_2 or activated hydrogen to release the metal (See column 3 lines 42-50)
- depositing the released metal over the semiconductor substrate to form a metal-comprising mass (See column 1 lines 45-60 and column 5 lines 10-22)

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,074,945 to Vaartstra et al. in view of 5,907,789 to Komatsu.

Incorporating all arguments of Claim 1 and noting that Vaartstra et al. fails to explicitly teach a substrate with an upper surface consisting of TiN, Ti, WN, W, TaN or Ta that is exposed to a reducing atmosphere and wherein the metal-comprising mass is formed against the upper surface.

However, Komatsu, in column 22 lines 13-30, teaches depositon of a metallo-organic precursor (such as: Ti, W, or Ta) in a reducing atmosphere. Furthermore, Komatsu teaches the deposition of metal (88) over a TiN layer. (See column 19 lines 20-40 and Figures 5A-5G) Finally, Komatsu teaches the deposition of the above materials to prevent the diffusion or electromigration of impurities. (See column 18 lines 26-30)

It would have been obvious to one of ordinary skill in the art to modify Vaartstra et al. in view of Komatsu's teachings of depositing a metallo-organic precursor (such as: Ti, W, or Ta) in a reducing atmosphere. Vaartsra's et al. modification via Komatsu's teachings is obvious because these metals prevent the diffusion or electromigration of impurities. Furthermore, Komatsu's et al. teachings show it to be functional.

8. Claims 6 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,074,945 to Vaartstra et al. in view of 6,271,131 to Uhlenbrock et al.

Incorporating all arguments of Claims 1 and 15 and noting that Vaartstra et al. fails to explicitly teach a metallo-organic precursor comprised of rhodium.

However, Uhlenbrock et al., in column 6 lines 1-8 and column 12 lines 12-15, teaches the deposition of rhodium as a metallo-organic precursor in a reducing atmosphere. Furthermore, Uhlenbrock et al. teaches that these metals can be deposited to form barrier layers or electrodes for use in a integrated circuit structure. (See column 2 lines 55-60)

It would have been obvious to one of ordinary skill in the art to modify Vaartstra et al. in view of Uhlenbrock's et al. teachings of depositing rhodium as a metallo-organic precursor in a reducing atmosphere. Vaartsra's et al. modification via Uhlenbrock's et al. teachings is obvious because rhodium can be depositied to form barrier layers or electrodes for use in an integrated circuit structure. Furthermore, Uhlenbrock's et al. teachings show it to be functional.

9. Claims 7-10 and 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over 6,074,945 to Vaartstra in view of 5,668,040 to Byun.

Incorporating all arguments of Claims 1 and 15 and noting that Vaartstra et al. fails to explicitly teach a metallo-organic precursor comprised of iridium, cobalt, palladium, nickel or platinum.

However, Byun, in column 5 lines 10-45, teaches the deposition of iridium, cobalt, palladium, nickel or platinum in an ammonia ambient. Furthermore, Byun teaches that these metals can be deposited to form barrier layers or highly conductive electrodes for use in a capacitor. (See column 5 lines 35-40)

It would have been obvious to one of ordinary skill in the art to modify Vaartstra et al. in view of Byun's teachings of depositing iridium, cobalt, palladium, nickel or platinum in an ammonia ambient. Vaartsra's et al. modification via Byun's teachings is obvious because iridium, cobalt, palladium, nickel or platinum (in an ammonia ambient) can be depositied to form a barrier layer or a highly conductive electrode for use in a capacitor structure. Furthermore, Byun's et al. teachings show it to be functional.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Hogans whose telephone number is (703) 305-3361. The examiner can normally be reached on M-F (7:30-4:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

Doug Wille
Patent Examiner

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May 15, 2002